

National Climatic Data Center

DATA DOCUMENTATION

FOR

DATA SET 5850 (DSI-5850)

Rocketsonde Observations

December 4, 2002

National Climatic Data Center
151 Patton Ave.
Asheville, NC 28801-5001 USA

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1. **Abstract:** Rocketry, as a means of gathering information from the atmosphere, appealed to scientists for many years; but it was not until the late 1950's that technology had advanced enough to allow a modest rocket-sounding program.

Prior to 1969, the World Data Center-A for Meteorology (collocated and operated by the National Climatic Data Center ([NCDC](#))) acted as the collection agency and was responsible for editing and publishing these upper air soundings. The pre-1969 observations were converted from magnetic tapes retained by the U.S. Air Force Air Weather Service. Beginning with the 1969 observations, responsibility for preparing observations was transferred to the National Climatic Data Center.

This rocketsonde data set is comprised of a network of approximately 42 stations located globally. Data for agency networks are forwarded to respective agency collection points where computers are used to reduce and record the observations uniformly.

The basic observational data set contains observation time in hours and minutes (UTC) and details of methods used, i.e., time difference between rocketsonde and rawinsonde, types of wind and thermodynamic sensors used, any special sensors, types of wind and thermodynamic correction methods, boundary altitudes of questionable data, rawinsonde instrument used, distance and direction of rawinsonde release point from rocket launch point, and altitude (geometric decameters), pressure (mb), and temperature (Deg. C) of the base data used. Rocketsonde parameters include time of observation (UTC), polar wind direction (whole degrees with respect to North) and speed (whole meters per second), North-South and East-West wind components (magnitude in whole meters per second), fall velocity (whole meters per second), temperature (Deg. C), and computed values of pressure (mb), density (grams per cubic meter-signed exponent), and speed of sound (whole meters per second).

The rocketsonde summaries - retention data file contains summaries and summaries squared totals of North-South and East-West wind components, pressure, density, and speed of sound.

2. **Element Names and Definitions:**

Basic Information format description:

FIELD NUMBER	COLUMN NUMBERS	ELEMENT NAME
01	01-05	Station Number
02	06-07	Year
03	08-09	Month
04	10-11	Day
05	12-15	Time of Observation - UTC
06	16-19	Rawinsonde Time Difference
07	20-22	Wind Sensor Code
08	23-25	Thermodynamic Sensor Code
09	26-27	Special Sensor AA@ Code
10	28	Special Sensor AA@ Correction Code
11	29-30	Special Sensor AB@ Code
12	31	Special Sensor AB@ Correction Code
13	32-33	Wind Correction Method
14	34-35	Thermodynamic Correction Method
15-16	36-43	Questionable Wind Layer

17-18	44-51	Questionable Thermodynamic Layer
19-21	52-61	Questionable Special Sensor Type and Layer
22	62-63	Radiosonde Type
23	64-65	Rawinsonde Release Point
24	66-69	Thermodynamic Base Altitude
25	70-74	Thermodynamic Base Pressure
26	75-78	Thermodynamic Base Temperature
27	79-80	Card Indicator

Explanation of above format, by field number:

FIELD NUMBER	RANGE OF VALUES	DESCRIPTION
01	00001 - 99999	WMO or WBAN number
02	57 - 99	2-digit year of observation
03	01 - 12	2-digit month of the year
04	01 - 31	2-digit day of the month
05	0000 - 2359	4-digit hour of the day UTC
06	+000 - +999	Number of minutes the rawinsonde is released AFTER the rocketsonde
	-000 - -999	Number of minutes the rawinsonde is released BEFORE the rocketsonde
07	000 - 999	Type of wind sensor used 000 = None 001 - 009 = Unassigned CHAFF 010 = Chaff 01- = Experimental 011 - 099 = Reserved PARACHUTE 100 = Unspecified 10- = Experimental 101 = 05 - 11 ft. diameter equivalent 102 = 12 - 18 ft. diameter equivalent 103 = Equal to or greater than 19 ft. diameter equivalent 104 - 199 = Reserved 200 - 399 = Unassigned SPHERE, PASSIVE 400 = Inflatable 40- = Inflatable, experimental 401 - 449 = Reserved SPHERE, INSTRUMENTED 450 = Inflatable 45- = Inflatable, experimental 451 - 499 = Reserved 500 = Solid 50- = Solid, experimental 501 - 549 = Reserved GRENADE 550 = Unspecified

55- = Experimental
551 - 599 = Reserved

STARUTE
600 = Unspecified
60- = Experimental
601 - 699 = Reserved

REMOTE SENSING
800 = Unspecified
80- = Experimental
801 - 899 = Reserved

900 = Unassigned

PREVIOUS INSTRUMENTS
901 = Chaff
902 = Parachute
903 = Chaff and chute
904 = Sphere (inflatable)
905 = Sphere (accelerometer)
906 = Grenade
907 = Balloon parachute
908 = Chemical trail
909 = Ram air decelerator

910 - 999 = Unassigned

08 000 - 999

Type of thermodynamic sensor used
SONDES

000 = None
001 - 009 = Unassigned
01- = Arcasonde experimental
010 = Arcasonde 1A, thin film
mount, 10 mil. (BT)
011 = Arcasonde 1A, long wire mount
012 = Arcasonde 4 (BT)
013 - 029 = Reserved

03- = STS experimental (BT)
030 = Unassigned
031 = STS 10 mil. (BT)
032 - 039 = Reserved

04- = MK-1 & MK-2 experimental (RW)
040 = MK-1 (RW)
041 = MK-2 (RW)
042 - 044 = Unassigned
045 = IT spiral wound tungsten (RW)
046 - 049 = Reserved

05- = AN/DMQ-9 experimental (BT)
050 = AN/DMQ-9 thin film mount 10
mil. (BT)
052 - 059 = Reserved

06- = Datasonde experimental
060 = Datasonde thin loop film

mount 10 mil. (BT)
 061 = Datasonde long lead wire 10
 mil. (BT)
 062 - 069 = Reserved

 07- = Echsonde ES 64-B experimental (RW)
 070 = Echsonde ES 64-B (RW)
 071 - 079 = Reserved

 080 - 398 = Unassigned

 399 = Experimental sondes other
 than those listed above

 SPHERE, PASSIVE
 400 = Inflatable
 40- = Inflatable experimental
 401 - 449 = Reserved

 SPHERE, INSTRUMENTED
 450 = Inflatable
 45- = Inflatable experimental
 451 - 499 = Reserved

 500 = Solid
 50- = Solid experimental
 501 - 549 = Reserved
 550 = Grenade
 55- = Grenade experimental
 551 - 599 = Reserved

 600 = Density gauge
 60- = Density gauge experimental
 601 - 649 = Reserved
 650 = Pressure gauge
 65- = Pressure gauge experimental
 651 - 699 = Reserved

 700 = Spinning wire densitometer
 70- = Spinning wire densitometer
 experimental
 701 - 799 = Reserved

 800 = Remote sensing
 80- = Remote sensing experimental
 801 - 899 = Reserved

 900 - 999 = Unassigned

 PREVIOUS INSTRUMENTS
 900 = Delta
 901 = DMQ-6
 902 = Gamma
 903 = Borg Warner
 904 = Gamma II
 905 = Hasp (instrumented)
 906 = PMR II
 907 = Sphere (inflatable)

		908	= Sphere (accelerometer)
		910	= Resistance wire
		911	= Metrosonde
		912	= Servo-Mech Sonde (SM-1)
		913	= Arcasonde II-A
		914	= Arcasonde II
		915	= Delta (TF)
		916	= Mini Loki (STS M.L.)
		917	= Solid state arcasonde
		918	= Experimental
		919 - 999	= Unassigned
09	00 - 99	Codes for special sensor AA@	
10	0 - 9	Correction codes for special sensor AA@	
11	same	Codes for special sensor AB@	
12	same	Correction codes for special sensor AB@	
		Codes for these two fields are the same:	
		0	= Not used
		1	= Original as proposed by developer
		2	= Second, on list for specific instrument
		3	= Third, on list for specific instrument etc.
13	00 - 99	Type of wind correction method used	
		00	= Not applicable
		01	= Eddy
		02	= Malet
		03 - 99	= Unassigned
14	00 - 99	Type of thermodynamic correction method used	
		00	= Not applicable
		01	= Wagner
		02	= Henry, IRIG MWG, 1968 (Arcasonde 1A)
		03	= Rubio & Ballard, STS
		04	= Rubio & Ballard (Arcasonde 1A)
		05	= Drews (Arcasonde 1A)
		06	= NOL White Oak
		07 - 99	= Unassigned
15	0000 - 9999	Top of questionable wind layer	
16	same	Bottom of questionable wind layer. Units of top and bottom are in hundreds of geometric meters	
17	0000 - 9999	Top of a layer of questionable thermodynamics	
18	same	Bottom of a layer of questionable thermodynamics. Units of top and bottom are hundreds of geometric meters	
19	same	Questionable special sensor type. Codes for these three fields are the same:	

		00 = Not applicable
		01 = Ozone (micro-mb)
		02 = O/O2 (nondimensional ratio)
		03 = Water vapor
		04 = CO2
		05 = NLC (lbs/cm3)
		06 = Electron density (E/cm3)
		07 = Electron temperature(deg. K)
		08 = Ion density (I/cm3)
		09 = Positive ion temperature (deg. K)
		10 - 99 = Unassigned
20	0000 - 9999	Top of a layer of questionable special sensor data
21	same	Bottom of a layer of questionable special sensor data
22	01 - 22	Type of radiosonde instrument used 01 = USA NOAA external thermister 02 = USA NOAA double-duct 03 = Bendix-Friez duct type 04 = USA military AN/AMT-4 05 = USA military AN/AMT-12 (incl. A&B) 06 = USA AN/AMQ-9 07 = Unassigned 08 = Canadian model IV 09 = German Democratic Republic Freiberg 10 = German Federal Republic Graw 11 = Indian chronometric 12 = Indian fan 13 = Japanese code sending 14 = British Kew 15 = French Metox 16 = Czechoslovakian Metra 17 = Pakistani 18 = Swiss modified 19 = USSR a-22-III (IV) 20 = Finnish Vaisala RS-12 21 = Finnish Vaisala RS-13 22 = Finnish Vaisala RS-14
		Note: Many of these instruments are used in other than the country of origin
23	00 - 99	Direction and distance of the rawinsonde release point from the rocket launch point High order position = direction Low order position = distance 00 = rawinsonde release point equal to or less than one kilometer DIRECTION IN DEGREES AND TENTHS 1 = 022.6 - 067.5 2 = 067.6 - 112.5 3 = 112.6 - 157.5

4 = 157.6 - 202.5
 5 = 202.6 - 247.5
 6 = 247.6 - 292.5
 7 = 292.6 - 337.5
 8 = 337.6 - 022.5

DISTANCE IN KILOMETERS AND TENTHS

1 = 01.1 - 05.0
 2 = 05.1 - 10.0
 3 = 10.1 - 20.0
 4 = 20.1 - 30.0
 5 = 30.1 - 40.0
 6 = 40.1 - 50.0
 7 = 50.1 - 75.0
 8 = 75.1 -100.0
 9 = more than 100

24	0000 - 9999	Altitude of the base data used in computations of equation of state or hydrostatic equation for rocketsonde observations, in geopotential decameters
25	0000 - 9999	Pressure of the base data used in computations of equation of state or hydrostatic equation for rocketsonde observations, in millibars and hundredths
26	+000 - +999 -000 - -999	Temperature of the base data used in computations of equation of state or hydrostatic equation for rocketsonde observations, in degrees Celsius and tenths
27	00	Card indicator, always 00 for Basic

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Questionable observations format description:

FIELD NUMBER	COLUMN NUMBERS	ELEMENT NAME
01	01-05	Station Number
02	06-07	Year
03	08-09	Month
04	10-11	Day
05	12-15	Time of Observation - UTC
06	16-35	Blank
07 - 08	36-43	Questionable Wind Layer
09 - 10	44-51	Questionable Thermodynamic Layer
11 - 13	52-61	Questionable Special Sensor Type and Layer
14	62-78	Blank
15	79-80	Record indicator

Explanation of above format, by field number:

FIELD NUMBER	RANGE OF VALUES	DESCRIPTION
01 - 13		(Refer to Basic Information section)

15 01 - 19 Record indicator, indicator, for questionable layers. Up to 19 questionable observation records may be indicated by this section.

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Mobile Station format description:

FIELD NUMBER	COLUMN NUMBERS	ELEMENT NAME
01	01-05	Station Number
02	06-07	Year
03	08-09	Month
04	10-11	Day
05	12-15	Time of Observation - UTC
06	16-19	Latitude
07	20-24	Longitude
08	25-78	Blank
09	78-80	Card indicator

Explanation of above format, by field number:

FIELD NUMBER	RANGE OF VALUES	DESCRIPTION
01 - 05		(Refer to Basic Information section)
06	000N - 900N 000S - 900S	Latitude of mobile rawinsonde station in degrees and tenths with North or South indicated alphanumerically in the low order position
07	0000W - 1800W	Longitude of mobile rawinsonde station in degrees and tenths with East or West indicated alphanumerically in the low order position
09	20	Card indicator. Always 20 for mobile rawinsonde.

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Rocketsonde Sounding format description:

FIELD NUMBER	COLUMN NUMBERS	ELEMENT NAME
01	01-05	Station Number
02	06-07	Year
03	08-09	Month
04	10-11	Day
05	12-15	Time of Observation - UTC
06	16-20	Altitude
07	21-23	Polar Wind Direction
08	24-26	Polar Wind Speed
09	27-30	North-South Wind Component
10	31-34	East-West Wind Component

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11	35-38	North-South Corrected Wind Component
12	39-42	East-West Corrected Wind Component
13	43-45	Fall Velocity
14	46-49	Temperature
15	50-52	Temperature Correction
16	53-59	Pressure
17	60-66	Density
18	67-69	Speed of Sound
19	70-72	Special Sensor AA@ Data
20	73-76	Special Sensor AB@ Data
21	77-78	Blank
22	79-80	Card indicator

Explanation of above format, by field number:

FIELD NUMBER	RANGE OF VALUES	DESCRIPTION
01 - 05		(Refer to Basic Information section)
06	00000 - 99999	Altitude of the level in geometric decameters corrected for the earth's curvature
07	000 - 360	Wind direction in whole degrees with respect to true North.
08	000 - 999	Wind speed in whole meters per second with respect to true North. Whenever fields 11 and 12 are entered, fields 07 and 08 represent a corrected wind also.
09	-000 - -999 b000 - b999	Magnitude of the North-South component wind in whole meters per second North = - in high order position South = b in high order position (b = blank)
10	-000 - -999 b000 - b999	Magnitude of the East-West component wind in whole meters per second East = - in high order position West = b in high order position (b = blank)
11	-000 - -999 b000 - b000	Wind components corrected by the method specified in field 13 of the Basic Information section. These fields are used by sites with computer capability. Notations are the same as those for non-corrected wind components (fields 09 - 10).
12	same	
13	000 - 999	Velocity at which the parachute, instrument package, etc. is falling in whole meters per second
14	b000 - b099 -001 - -999	Temperature of the level in whole degrees Celsius

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		b000 - b099 = +00 to +99 deg. C -001 - -999 = -01 to -999 deg. C
15	b00 - b99 -01 - -99	Corrections that were applied to the measured temperatures in whole degrees Celsius b000 - b099 = +00 to +99 deg. C -001 - -999 = -01 to -999 deg. C When the values in field 14 are corrected temperatures, field 15 should contain the amount of correction applied
16	0.000+0 - 9.999+9 0.000-0 - 9.999-9	Pressure in millibars with a signed exponent. The decimal point and exponent sign will always appear in the positions indicated EXAMPLES 4.564-1 = 0.4564 millibars 4.564+0 = 4.564 millibars 4.564+1 = 45.64 millibars This field should always contain four significant figures of pressure plus the decimal point and exponent sign
17	0.000+0 - 9.999+9 0.000-0 - 9.999-9	Density in grams per cubic meter with a signed exponent. The decimal point and exponent sign will always appear in the positions indicated EXAMPLES 5.092-2 = 0.05092 gm/m3 5.092+0 = 5.092 gm/m3 5.092+1 = 50.92 gm/m3
18	000 - 999	Speed of sound in whole meters per second. Either these values were entered from a table presenting speed of sound in dry air as a function of temperature, according to classical theory, or were computed when table limits were exceeded.
19	3 spaces	Blank - reserved for future use
20	4 spaces	Blank - reserved for future use
21	2 spaces	Blank
22	30	Card indicator. Always 30 for rocketsonde sounding data. One record for each level. Levels are in descending order, the highest attained altitude being first.

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Constant Pressure Level format description:

FIELD NUMBER	COLUMN NUMBERS	ELEMENT NAME
01	01-05	Station Number
02	06-07	Year
03	08-09	Month
04	10-11	Day
05	12-15	Time of Observation - UTC
06	16-20	Altitude
07	21-23	Polar Wind Direction
08	24-26	Polar Wind Speed
09	27-30	North-South Wind Component
10	31-34	East-West Wind Component
11	35-38	North-South Corrected Wind Component
12	39-42	East-West Corrected Wind Component
13	43-45	Blank
14	46-49	Temperature
15	50-52	Temperature Correction
16	53-59	Pressure
17	60-66	Density
18	67-69	Speed of Sound
19	70-72	Special Sensor AA@ Data
20	73-76	Special Sensor AB@ Data
21	77-78	Blank
22	79-80	Card indicator

Explanation of above format, by field number:

FIELD NUMBER	RANGE OF VALUES	DESCRIPTION
01 - 05		(Refer to Basic Information section)
06	00000 - 99999	Altitude of the constant pressure level in geopotential decameters
07	000 - 360	Wind direction in whole degrees with respect to true North.
08	000 - 999	Wind speed in whole meters per second. Whenever fields 11 and 12 are entered, fields 07 and 08 represent a corrected wind also
09	-000 - -999 b000 - b999	Magnitude of the North-South component wind in whole meters per second North = - in high order position South = b in high order position (b = blank)
10	-000 - -999 b000 - b999	Magnitude of the East-West component wind in whole meters per second East = - in high order position West = b in high order position (b = blank)

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11 -000 - -999 Wind components corrected by the method
 b000 - b000 specified in field 13 of the Basic
 Information section. These fields are
 used by sites with computer capability.
 Notations are the same as those for non-
 corrected wind components (fields 09 - 10).

12 same

13 3 spaces Blank. Not used in this section.

14 b000 - b099 Temperature of the level in whole degrees
 -001 - -999 Celsius
 b000 - b099 = +00 to +99 deg. C
 -001 - -999 = -01 to -999 deg. C

15 b00 - b99 Corrections that were applied to the
 01 - -99 measured temperatures in whole degrees
 Celsius
 b000 - b099 = +00 to +99 deg. C
 -001 - -999 = -01 to -999 deg. C

When the values in field 14 are
 corrected temperatures, field 15 should
 contain the amount of correction applied

16 0.000+0 - 9.999+9 Pressure in millibars with a signed
 0.000-0 - 9.999-9 exponent. The decimal point and
 exponent sign will always appear in the
 positions indicated. When available,
 the following levels will be reported.

4.000-1 = 0.4 millibars
 7.000-1 = 0.7 "
 1.000+0 = 1.0 "
 2.000+0 = 2.0 "
 3.000+0 = 3.0 "
 5.000+0 = 5.0 "
 7.000+0 = 7.0 "
 1.000+1 = 10.0 "
 2.000+1 = 20.0 "
 3.000+1 = 30.0 "
 5.000+1 = 50.0 "

17 0.000+0 - 9.999+9 Density in grams per cubic meter with a
 0.000-0 - 9.999-9 signed exponent. The decimal point and
 exponent sign will always appear in the
 positions indicated

EXAMPLES
 5.092-2 = 0.05092 gm/m3
 5.092+0 = 5.092 gm/m3
 5.092+1 = 50.92 gm/m3

18 000 - 999 Speed of sound in whole meters per second.
 Below 90 km these values may have been entered
 from a table presenting speed of sound in dry

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air as a function of temperature, according to classical theory

19	3 spaces	Blank - reserved for future use
20	4 spaces	Blank - reserved for future use
21	2 spaces	Blank - reserved for future use
22	40	Card indicator. Always 40 for constant pressure data. One record for each level. Levels are in descending order, the least pressure being first.

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Rawinsonde Levels format description:

FIELD NUMBER	COLUMN NUMBERS	ELEMENT NAME
01	01-05	Station Number
02	06-07	Year
03	08-09	Month
04	10-11	Day
05	12-15	Time of Observation - UTC
06	16-20	Altitude
07	21-23	Polar Wind Direction
08	24-26	Polar Wind Speed
09	27-30	North-South Wind Component
10	31-34	East-West Wind Component
11	35-45	Blank
12	46-49	Temperature
13	50-52	Blank
14	53-59	Pressure
15	60-78	Blank
16	79-80	Card indicator

Explanation of above format, by field number:

FIELD NUMBER	RANGE OF VALUES	DESCRIPTION
01 - 05		(Refer to Basic Information section)
06	00000 - 99999	Altitude of the level in geopotential decameters
07	000 - 360	Wind direction in whole degrees with respect to true North.
08	000 - 999	Wind speed in whole meters per second
09	-000 - -999 b000 - b999	Magnitude of the North-South component wind in whole meters per second North = - in high order position South = b in high order position (b = blank)
10	-000 - -999	Magnitude of the East-West component

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	b000 - b999	wind in whole meters per second East = - in high order position West = b in high order position (b = blank)
11	11 spaces	Blank
12	b000 - b999 -001 - -999	Temperature in degrees Celsius and tenths b000 - b999 = +00.0 to +99.9 deg. C -001 - -999 = -00.1 to -99.9 deg. C
13	3 spaces	Blank
14	0.000+0 - 9.999+9 0.000-0 - 9.999-9	Pressure in millibars with a signed exponent. The decimal point and exponent sign will always appear in the positions indicated. Pressures of less than 1000 mb are reported to tenths of a millibar.

EXAMPLES

1.000+3 = 1000 millibars
8.523+2 = 852.3 "

15	19 spaces	Blank
16	50	Card indicator. Always 50 for rawinsonde data. One record per level. Levels are in descending order, the least pressure being first.

3. **Start Date:** 19570101

4. **Stop Date:** Ongoing.

5. **Coverage:** Global

1. Southernmost Latitude: 90S
2. Northernmost Latitude: 90N
3. Westernmost Longitude: 180W
4. Easternmost Longitude: 180E

6. **How to Order Data:**

Ask NCDC's Climate Services about the cost of obtaining this data set.
Phone: 828-271-4800
FAX: 828-271-4876
e-mail: NCDC.Orders@noaa.gov

7. **Archiving Data Center:**

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, NC 28801-5001
Phone: (828) 271-4800.

8. **Technical Contact:**

:
:
:

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, NC 28801-5001
Phone: (828) 271-4800.

9. **Known Uncorrected Problems:** Poor and improper documentation of measurement units is a constant problem.
10. **Quality Statement:** Although extensive computer and personnel quality controls were and are applied, experience has shown that this data set still contains some erroneous values. The user should be prepared, at least, to detect and exclude gross data errors.
11. **Essential Companion Datasets:** None.
12. **References:**
Selective Guide to Climatic Data Sources, U.S. Dept. of Commerce, Washington, D.C.